Docket Number F-3278 Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Skeem, et al

#22 Dec 3/13/98

Serial Number: 08/616,538 Examiner: G.Nguyen

Filed: 3/15/96 Group Art Unit: 3203

For: Metal Single Layer Abrasive Having a Contoured Cutting Surface

The Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

DECLARATION UNDER 37 CFR Section 1.132
of Inventor Sergej-Tomislav Buljan

1. I am a named inventor of the above-captioned patent application and I make this declaration in support of the patentability of the application over cited references U.S. Pat. No. 5,018,276 to Asada ("Asada") and U.S. Pat. No. 5,215,072 to Scott ("Scott").

2. I have a PhD in Solid State Science from The Pennsylvania State University, and over 30 years of experience in research and development working with a variety of materials. I presently hold the position of Manager, Metal Bond Research and Development, Superabrasives, at Norton Company where I have worked in research and development relating to superabrasives and metal bonded cutting and grinding tool technologies for over 4 years.

3. Attached to my declaration are copies of laboratory notebook MB8.1, pages 112-114, 147-9 and 159, evidencing an experimental comparison of the grinding performance of two diamond abrasive grinding tools carried out under my supervision. The

performance is shown graphically on page 159 where the electroplated tool data points are depicted in the lower line with a diamond and the brazed single layer tools are depicted in the upper line with a square. From this graph one would conclude that although both tools contain the same size and concentration of diamond abrasive in a metal bond, the electroplated tool initially removes less substrate and rapidly loses effectiveness in comparison to a brazed single layer tools made with a bronze braze that is chemically bonded to the diamond abrasive.

4. In my opinion, the inferior performance of the electroplated tool is due to the much weaker mechanical attachment between the abrasive and the substrate created in the electroplated tool relative to the much stronger chemical bond between the abrasive and the substrate created in the brazed tool made with a chemically active braze.

5. I expect such performance differences to occur in grinding tools, cutting tools, polishing tools, chain saws, drilling tools or other tools containing diamond abrasive grains whenever the grains are electroplated rather than chemically bonded to the tool substrate.

6. The Asada tools may be distinguished from the tools of the invention and are expected to have inferior performance in comparison with the tools of the invention because the Asada tools contain electroplated diamond abrasive and do not contain chemically bonded diamond abrasive.

7. The Scott tools are expected to have inferior performance in comparison with the tools of the invention because the Scott tools do not contain diamond abrasive chemically bonded to the mesh of the substrate.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that the statements were made with the knowledge that willful false statements and the like so made are

punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Sergej-Tomislav Buljan, PhD

Date: 5/29/97

Norton Company
1 New Bond Street
Box Number 15138
Worcester, Massachusetts 01615-0138

P\\f\3278dec.doc

-120/+140 Bull Gr. Antaston · Project / Book · TITLE .76333/2 = .38166 grams ... at

From Page No.

Polishing Disk #2

on MSL scale

initial weight 203.25 grams → 203.00 g → 202.9

202.

t=0	90.81		89.06		98.95		overall weight lo.
after 1 minute	90.04	.77	88.28	.78	98.21	.74	
0 2	89.39	.65	87.64	.64	97.58	.63	←
1 3	88.72	.67	86.98	.66	96.95	.63	
2 4	88.17	.55	86.46	.52	96.42	.53	
3 5	87.70	.47	85.97	.49	95.96	.46	
4 6	87.27	.43	85.54	.43	95.55	.41	
5 7	86.88	.39	85.15	.39	95.17	.38	
6 8	86.50	.38	84.79	.36	94.81	.36	
3	85.93	.57	84.20	.59	94.26	.55	←
4	85.40	.53	83.67	.53	93.75	.51	
5	84.92	.48	83.18	.49	93.28	.47	
6	84.45	.47	82.73	.45	92.85	.43	
7	84.00	.45	82.27	.46	92.42	.43	
8	83.56	.44	81.84	.43	92.00	.42	
9	83.15	.41	81.46	.38	91.61	.39	
10	82.75	.40	81.06	.40	91.23	.38	
11	82.37	.38	80.69	.37	90.86	.37	

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To Page

Witnessed & Understood by me, | Date | Invented by GRAPH ON PAGE 159 | Date 12/4/95

Recorded by

-14 MSL BRAZED DIS Mo Clagen [redacted] Proj ct No.[redacted] Book No.[redacted] Hoots at flats

age No.

81.62	79.98	90.16
80.89	79.33	89.53
80.24	78.74	88.96
79.66	78.19	88.41
79.02	77.66	87.89
78.50	77.16	87.40
77.95	76.65	86.91
77.40	76.18	86.45
76.90	75.74	86.03
76.43	75.30	85.58
75.78	74.70	84.96
75.14	74.09	84.35
74.54	73.52	83.79
74.12	73.00	83.28
73.63	72.53	82.78
73.35	72.11	82.36
72.91	71.77	81.95
72.59	71.39	81.57

72
28

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Project No.

Book

TITLE MSL BRAZED DISK

From Page No.

58	72.29	71.05	81.20
61	72.06	70.73	80.86
71	71.45	69.82	79.80
81	71.10	69.29	78.87
91	70.54	69.05	78.04
101	70.18	68.80	77.27
111	70.07	68.35	76.57
121	69.95	68.06	75.95
141	69.49	67.81	74.81
161	69.01	67.62	73.85 .96

SAMPLES 1, 2 GETTING TO SHORT TO USE

USE SAMPLE 3

~~181~~

To Page N

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Dat

Invented by

Dat 12/4/95

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Page No.	SAMPLE 1		SAMPLE 2		SAMPLE 3		initial sample weight
0	168.59		164.23		163.05		
	25 19 27		17 37 19		19 31 21		
1	167.95	.64	163.55	.68	162.42	.63	
2	167.55	.40	163.16	.39	162.01	.41	
	15 15 15		19 15 19		15 15 13		
3	167.23	.32	162.82	.34	161.69	.32	
	15 13 13		15 15 15		17 15 17		
4	166.97	.26	162.56	.26	161.43	.26	
	11 9 11		13 13 13		15 11 11		
5	166.74	.23	162.32	.24	161.21	.22	
	11 13 11		11 11 9		11 11 13		
6	166.54	.20	162.12	.20	161.02	.19	
	11 11 11		11 11 11		13 11 11		
7	166.39	.15	161.95	.17	160.85	.17	
	9 9 13		11 9 9		11 13 11		
8	166.22	.17	161.78	.17	160.70	.15	
	9 9 9		11 11 13		9 11 11		
9	166.09	.13	161.65	.13	160.57	.13	
	11 11 9		11 9 9		9 11 9		
10	165.97	.12	161.53	.12	160.46	.11	
	11 11 11		11 11 11		11 11 11		
12	165.77	.20	161.34	.19	160.25	.21	
	7		11		9		
14	165.61	.16	161.16	.16	160.09	.16	
	5		9		5		
16	165.48	.13	161.07	.15	159.95	.14	
	5		5		7		
18	165.36	.12	160.89	.12	159.84	.11	
	5		5		5		
20	165.24	.12	160.77	.12	159.73	.11	
	5		5		5		
22	165.16	.08	160.68	.09	159.65	.08	
	5		5		5		
24	165.06	.10	160.57	.11	159.59	.11	
	5		5		5		

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Date at first

Invented by GRAPH ON PAGE 159

Date 3/7/96

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Project No.______
Book No.______ TITLE electroplated Disk

From Page No.__

26	164.98	.08	160.48	.09	159.46	.08
	5		5		3	
28	164.89	.09	160.40	.08	159.38	.08
	5		3		5	
30	164.82	.07	160.31	.09	159.30	.08
	3		3		3	
33	164.69	.13	160.19	.12	159.19	.11
	3		3		3	
36	164.60	.09	160.07	.12	159.08	.11
	3		3		3	
39	164.49	.11	159.97	.10	158.98	.10
	3		3		3	
42	164.39	.[illegible]0	159.86	.11	158.88	.10
	3		3		3	
45	164.29	.10	159.75	.11	158.77	.11
	3		3		3	
48	164.19	.10	159.65	.10	158.68	.09
	3		3		3	
51	164.09	.10	159.55	.10	158.59	.09
	5		3		3	
54	164.01	.08	159.45	.10	158.50	.0[illegible]
	3		3		3	
51	163.9[illegible]	.[illegible]0	159.36	.09	158.41	.0[illegible]
	3		3		3	
60	163.84	.08	159.27	.09	158.33	.0[illegible]
	5		3		3	
70	163.52	.32	158.96	.31	158.05	.2[illegible]
	3		3		3	
80	163.26	.26	158.67	.29	157.77	.28
	3		3		3	
90	163.00	.26	158.41	.26	157.51	.26
	3		3		3	
100	162.75	.25	158.15	.26	157.28	.2[illegible]
	3		3		3	
110	162.53	.20	157.92	.23	157.08	.2[illegible]
	3		3		3	
120	162.32	.19	157.70	.18	156.87	
	3		3		3	

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120 → 125 distribution

140 → 204

Recorded by Crowning Eng

Page No.

0	161.94	.38	157.33	.37	156.53	.34
	Ra = 3		3		3	
60	161.57	.37	156.96	.37	156.20	.33
	3		3		3	
	169.02		156.67		162.64	
= 0						
= 5	168.01	1.01	155.67	1.00	161.69	.95

.197 grams/minute Ra = 13 micro-inches

* disk was dressed with dressing stick provided By struers after 160 minutes

10	167.27	.74	155.06	.61	161.07	.62	Ra = 11,9,9

.13 gram/minute

.0185

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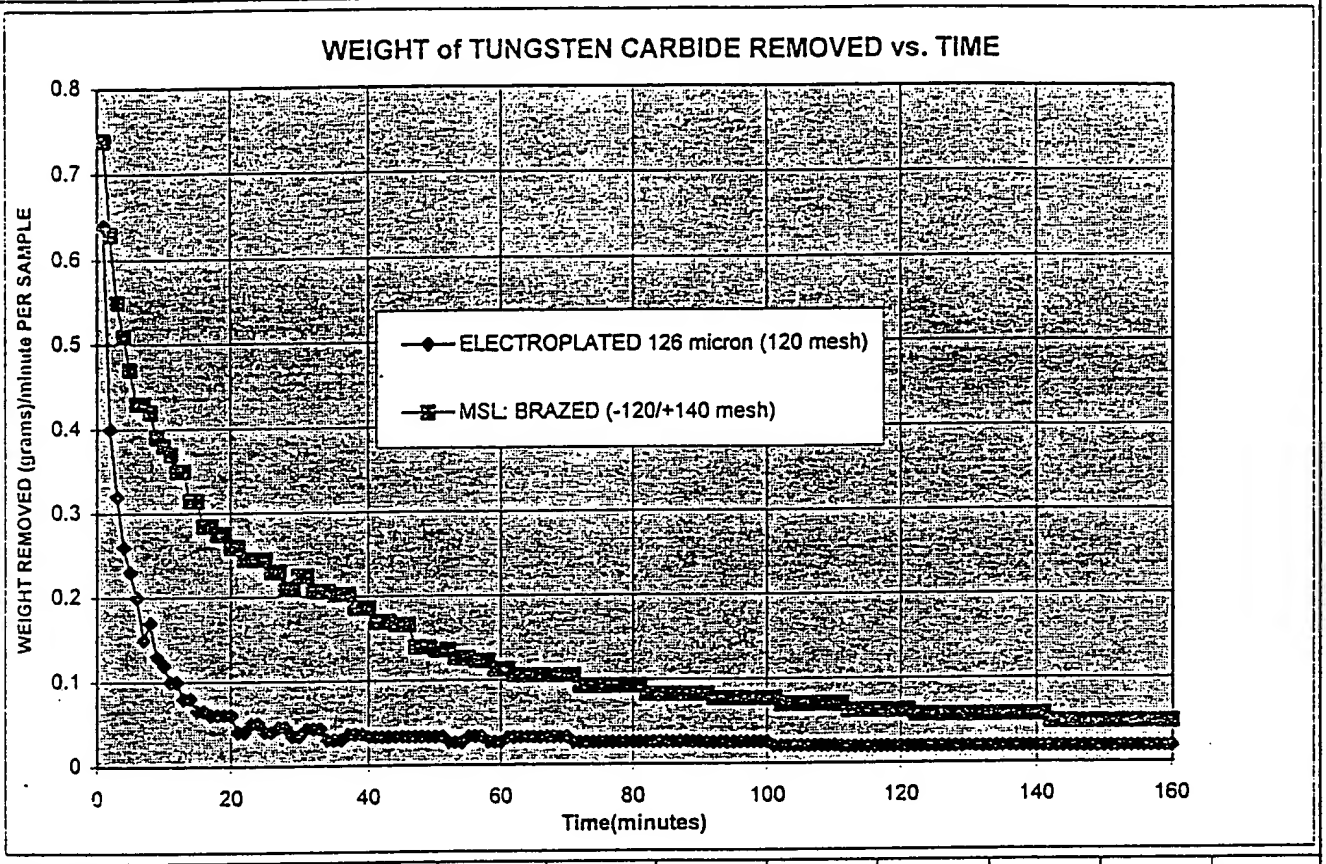
METAL BONDED DISK TESTING
NOTEBOOK NO. MB8.1 ISSUED TO ERIC SCHULZ ON 4/10/95
MSL BRAZED DISK -120/+140 mesh: PAGES 112 AND 159
STRUERS ELECTROPLATED DISK 126 micron (120 mesh): PAGES 147 AND 159



EQUIPMENT:
STRUERS MACHINE: PEDEMAT/ROTOPOL-2
SPECIMEN MOVER PLATE TYPE "PEDON" FOR 1-6 SPECIMENS: 1" DIA.
GRINDING CONDITIONS:
30 NEWTONS, COUNTERFLOW, 300 RPM, SINGLE SAMPLE, WATER COOLANT ON
NOTES:
SPECIMEN MOVER PLATE OFFSET FROM TURNTABLE CENTER = 2 inches
3 TUNGSTEN CARBIDE SPECIMENS WERE PLACED IN SPECIMEN HOLDER
DIAMETER OF TUNGSTEN CARBIDE SPECIMENS = 1"
MSL DISK SPECIFICATIONS:
MATERIAL: 304 STAINLESS STEEL, DIAMETER = 9-7/8", THICKNESS = .0625" (16 GAUGE)
PATTERN: HEXAGONS. CENTER TO CENTER SPACING = 7.2 mm, MAJOR DIAGONAL = 5.9 mm
.010" THICK STENCIL USED. DIAMETER OF COATED AREA = 8-7/8", RATIO OF LAND AREA TO OPEN AREA = 1 TO 1
ABRASIVE TYPE: PDA 8775 M4D, ABRASIVE SIZE: -120/+140 mesh, ABRASIVE CONCENTRATION: FULL
BRAZE TYPE: MXL 2000

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